

REMARKS

Claims 7-18 are currently pending in the application.

Claims 7 and 13 have been amended to add the step of transferring the heat from the heat exchange fluid exiting the shell to the hydrocarbon fuel prior to feeding it into the catalytic partial oxidation reactors to vaporize the hydrocarbon fuel. Support for this amendment is found in the Specification at paragraphs [0040]-[0041].

Reconsideration of the present application and allowance of the pending claims is respectfully requested in view of the following remarks.

Non-obviousness

The Office Action has rejected claims 7-18 under 35 U.S.C. 103(a) as obvious over U.S. Patent No. 6,221,280 to Anumakonda et al. (hereinafter "Anumakonda") in view of U.S. Patent Publication No. 2002/0041986 to Wojtowicz et al. (hereinafter "Wojtowicz"), in further view of U.S. Patent No. 4,331,451 to Isogaya et al. (hereinafter "Isogaya"), in further view of U.S. Patent Publication No. 2002/0114747 to Marchand et al. (hereinafter "Marchand"), and in further view of U.S. Patent No. 6,602,317 to Metius et al. (hereinafter "Metius"). The Office Action states that it would have been obvious to one of ordinary skill in the art, at the time of the Applicants' invention, to combine Anumakonda, Wojtowicz, and Isogaya to provide heat from an oxidation reaction to an inlet stream in order to prevent the deposition of carbon on a catalyst bed and to provide a closed vessel where at least one passage of a heat exchanger extends through a portion of the reaction chamber of Anumakonda in order to use the heat supplied by the exothermic oxidation for other parts of the reaction, as taught by Marchand. In addition, the Office Action posits that it would have been obvious to the skilled artisan, at the time of the Applicants'

invention, to provide multiple partial oxidation reactors, as taught by Metius, in a shell parallel to and spaced from one another such that each is offset from another, as determined by routine experimentation. The rejections are respectfully traversed as applied to the amended claims in view of the following remarks.

Applicants' Claims

Applicants' claims describe methods comprising feeding a feed gas into plurality of catalytic partial oxidation reactors disposed in a shell *parallel to and spaced from one another such that each is offset from another*, reacting the feed gas to convert it to an exit gas mixture of hydrogen and carbon monoxide, passing a heat exchange fluid past the catalytic partial oxidation reactors with the heat exchange fluid flowing in the same direction of reactant flow in the reactors such that heat from partial oxidation in the reactors transfers to the heat exchange fluid, and transferring the heat from the heat exchange fluid exiting the shell to the hydrocarbon fuel prior to feeding it into the catalytic partial oxidation reactors to vaporize the hydrocarbon fuel. Such a configuration allows for more efficient heat transfer (See page 11, line 20 to page 12, line 23).

The Cited References

Anumakonda discloses an apparatus for catalytic partial oxidation of hydrocarbons.

Wojtowicz discloses a method for producing a hydrogen-rich gas from a hydrocarbonaceous material by (1) pyrolysis of the hydrocarbonaceous material to produce carbon-rich residue and hydrogen gas and (2) combusting a portion of the carbon-rich residue. In one embodiment, a carbon monoxide oxidizer may be used and coupled with a heat-recovery unit to combust hydrogen exiting a fuel cell.

Isogaya discloses a process for catalytic gasification of heavy distillates, where the catalyst bed must be at least 800°C and the inlet temperature must be higher than 500°C.

Marchand discloses a shift reactor integrated with an absorbent bed having heat transfer passages extending through the reactor bed so that heat may be transferred from the shift reactor and the absorbent bed to a coolant. In another embodiment, a first-stage selective oxidizer provides heat for a shift reactor. Paragraphs [0156]-[0163] and [0133].

Metius discloses an apparatus for controlling the temperature uniformity in a shaft furnace having one or multiple partial oxidation reactors for generating reducing gas to be fed to the furnace.

No Prima Facie Obviousness

According to M.P.E.P. §2142, three basic criteria must be met to establish a *prima facie* case of obviousness. First, there must be some suggestion or modification, either in the references themselves or the knowledge generally available to one of ordinary skill in the art to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Third, the prior art reference (or references when combined) must teach or suggest all of the claim limitations. The teaching or suggestion to make the claim combination and the reasonable expectation of success must both be found in the prior art, and not based on Applicants' disclosure. *In re Vaeck*, 947 F.2d 488 20 U.S.P.Q. F.2d 1438 (Fed. Cir. 1991).

Applicants respectfully submit that Anumakonda, Wojtowicz, Isogaya, Marchand, and Metius do not establish a *prima facie* case of obviousness against claims 7 and 13 because their combination does not teach or suggest all of the claim limitations. Nothing in Anumakonda,

Wojtowicz, Isogaya, Marchand, or Metius, alone or in combination, discloses or suggest a plurality of catalytic partial oxidation reactors disposed in a shell parallel to and spaced from one another such that each is offset from another. Nor does the combination of the references disclose or suggest passing a heat exchange fluid through a shell past a plurality of catalytic partial oxidation reactors in the same direction of reactant flow such that heat from the reactor transfers to the heat exchange fluid and is then transferred to hydrocarbon fuel prior to feeding it into the catalytic partial oxidation reactors to vaporize the hydrocarbon fuel.

In addition, there is no motivation combine or modify any of the references to yield the methods of Applicants' claims. Isogaya's statement of the operating temperatures in a catalyst bed does not provide motivation for placing multiple reactors in a shell, parallel to and spaced from one another, and offset from another, as Applicants' claims specify. Nor do the disclosures in Wojtowicz and Marchand, of transferring heat from a carbon monoxide oxidizer to a separate heat-recovery unit or a first-stage selective oxidizer to a separate shift reactor, respectively, provide motivation for feeding a feed gas into plurality of catalytic partial oxidation reactors disposed in a shell parallel to and spaced from one another such that each is offset from another, as required by Applicants claims.

Moreover, the present rejection is clearly based on an improper "obvious to try" rationale. The Federal Circuit has stated that:

"... 'obvious to try' is not the standard under § 103". . . . In some cases, what would have been 'obvious to try' would have been to vary all parameters or try each of numerous possible choices until one possibly arrived at a successful result, where the prior art gave either no indication of which parameters were critical or no direction as to

which of many possible choices is likely to be successful. . . . In others, what was ‘obvious to try’ was to explore a new technology or general approach that seemed to be a promising field of experimentation, where the prior art gave only general guidance as to the particular form of the claimed invention or how to achieve it.” *In re O’Farrell*, 853 F.2d 894, 903, 7 USPQ2d 1673, 1681 (Fed. Cir. 1988) (citations omitted).

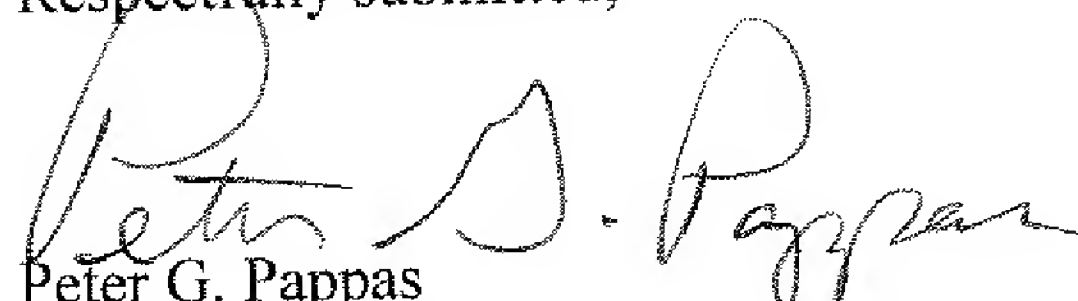
In the present case, the Examiner incorrectly concludes that it would be obvious for a person of ordinary skill in the art to specifically place multiple reactors in a shell, parallel to and spaced from one another, and offset from another based a mere mention of the use of multiple reactors in Metius and the Examiner’s unsupported assumption that such a configuration is readily determined by routine experimentation. Nothing in the prior art as a whole indicates that more effective heat transfer can be attained by the claimed configuration. Anumakonda, Wojtowicz, Isogaya, Marchand, and Metius each disclose exothermic reactions, but none of these references, alone or in combination teach or suggest reactors in a shell, parallel to and spaced from one another, and offset from another, as specified in Applicants’ claims, to achieve more effective heat transfer. Furthermore, none of the cited references, alone or in combination, disclose or suggest such a configuration of multiple reactors used in combination with the transfer of the heat from the heat exchange fluid exiting the shell to the hydrocarbon fuel prior to feeding it into the catalytic partial oxidation reactors to vaporize the hydrocarbon fuel, as required by Applicants’ claims

Therefore, a *prima facie* case of obviousness has not been established and the Applicants’ claims are novel and nonobvious.

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In view of the present response to Office Action, Applicants respectfully requests that a timely Notice of Allowance be issued in this case. If there are any issues which can be resolved by a telephone conference or an examiner's amendment, the Examiner is invited to telephone the attorney at (404) 853-8036.

Respectfully submitted,


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